2009

PHYSICS

(Honours)

SIXTH PAPER (Phys-212)

(Wave, Acoustic and Optics)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer *any* **five** questions

1. (a) Show that the velocity of transverse waves in a stretched string is $v = \sqrt{T/m}$, where T = tension in the string and m = mass per unit length. 7

    (b) Show that the number of beats in the sound of two sources is equal to the difference in frequencies of the sources. 5

2. What is live and dead room? Derive Sabine's formula for reverberation, and obtain the absorption coefficient. 3+6+3=12

(*Turn Over*)

3. (a) Prove that $y = x^2 + c^2 t^2$ is a solution of one-dimensional wave equation, where c is wave velocity, t is time and x is the position coordinate.   4

(b) A string of length 2 m is divided into three segments, such that their frequencies are in ratio $1 : 2 : 3$. Find the length of each segment.   4

(c) What is double refraction? Discuss with example of polaroid.   2+2=4

4. With necessary diagram, define interference of light. What are the conditions necessary for interference? Prove that the distance between two consecutive bright and dark fringes is the same.   2+3+7=12

5. (a) What is a zone plate? Show that the area of the nth zone is independent of n.   2+6=8

(b) Describe different methods of polarisation.   4

6. (a) What is chromatic aberration? Prove that axial chromatic error for parallel rays is $f_r - f_R = wf$, where the symbols have their usual meanings.   2+5=7

(b) Obtain the relation for the equivalent focal length of two thin lenses in contact.   5

   (*Continued*)

7. (a) What is normal and anomalous dispersion? 2+2=4

 (b) Discuss the theory of dispersion in detail. 8

8. Write short notes on any *two* : 6×2=12

 (a) Fabry-Perot interferometer

 (b) Explanation of the formation of Newton's rings

 (c) Concave grating

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